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MIL-C-63989C(AR)
15 February 1994
SUPERSEDING
MIL-C-63989B(AR)
25 September 1991

MILITARY SPECIFICATION

CARTRIDGE, 5.56MM, BALL, M855

This specification is approved for use by the U.S. Army Armament, Munitions and Chemical Command, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the M855 Ball cartridge for use in 5.56mm weapon systems with a "one in seven" (one revolution in seven inches) barrel twist (see 6.1).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specification and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

MILITARY

MIL-A-2550	-Ammunition, General Specification for
MIL-A-48078	-Ammunition Standard Quality Assurance Provisions, General Specification for

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document, should be addressed to: Commander, U.S. Army ARDEC, ATTN: SMCAR-BAC-S, Picatinny Arsenal, New Jersey 07806-5000 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A **FSC 1305**

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STANDARDS

MIL-STD-109	-Quality Assurance Terms and Definitions
MIL-STD-636	-Visual Inspection Standards and Inspection Procedures for Small Arms Ammunition through Caliber .50
MIL-STD-644	-Visual Inspection Standards and Inspection Procedures for Inspection of Packaging, Packing, and Marking of Small Arms Ammunition
MIL-STD-1168	-Lot Numbering of Ammunition

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the DODSSP - Customer Service, Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094).

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS (See 6.5)

US ARMY ARMAMENT RESEARCH DEVELOPMENT AND ENGINEERING CENTER (ARDEC)

7643674	-Classification of Cartridge Case Defects for Small Arms Ammunition
9342868	-Cartridge, 5.56MM, Ball M855
9342869	-Bullet, Ball, 5.56MM
9349656	-Slug
9349657	-Jacket
9349678	-Jacket, Pointed
9392530	-Jacket, Pointed (Alternative)
9392531	-Bullet, Ball, 5.56mm (Alternative)

INSPECTION EQUIPMENT

LI-9342868	-Index of Inspection Equipment Lists for Cartridge, 5.56mm Ball, M855

PACKAGING & MARKING

12551963	-Packing and Marking for Box, Wirebound for Cartridge 5.56mm
12590217	-Packing and Marking for Box, Wirebound for PA108 Ammunition Container

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PUBLICATIONS

SCATP-5.56MM (Heavy Bullet) -Small Caliber Ammunition Test Procedures for 5.56mm (Heavy Bullet) Cartridges

(Copies of other Government documents, drawings and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer).

2.2 Non-Government publications. The following document forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (See 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E92 -Method of Test for Vickers Hardness of Metallic Materials

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1137).

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained. (See contract provisions for additional precedence criteria.)

3. REQUIREMENTS

3.1 Cartridge. The cartridge shall comply with all requirements specified on drawing 9342868, all associated drawings and with all requirements specified in applicable specifications and standards.

3.2 Component parts and materials. Component parts and materials shall be in accordance with the applicable drawings and specifications.

3.3 Bullet extraction. The force required to extract the bullet from the cartridge case shall be not less than 45 pounds.

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3.4 Residual stress. The cartridge case shall not split when subjected to a one percent mercurous nitrate solution for 15 minutes.

3.5 Waterproofness. The cartridge shall not release more than one bubble of air when subjected to a positive internal pressure of 7.5 pounds per square inch (psi) for 30 seconds minimum.

3.6 Velocity. The average velocity of the cartridges, conditioned at 70° ± 2°F, shall be 3000 feet per second (fps) plus or minus 40 fps at 78 feet from the muzzle of the weapon. The standard deviation of the velocities shall not exceed 40 fps.

3.7 Chamber pressure. The average chamber pressure of the sample cartridges, conditioned at 70° ± 2°F shall not exceed 55,000 psi. Neither the chamber pressure of an individual sample test cartridge nor the average chamber pressure plus three standard deviations of chamber pressure shall exceed 61,000 psi.

3.8 Port Pressure. The mean port pressure minus three standard deviations shall not be less than 12,700 psi for sample cartridge conditioned to 70° ± 2°F.

3.9 Penetration. The bullet of the sample cartridges shall demonstrate complete penetration of 10 gage (.135 inch) thickness AISI 1010 to 1020 steel plate target with hardness between RB 55 minimum and RB 70 maximum, (NATO plate) positioned at 0 ± 5° obliquity and located 656 yards (600 meters) from the weapon. Additionally an aluminum witness plate (2024-T3 or equivalent nominally 0.020" thick) shall be located 6 inches behind the target to determine penetration. Testing shall be performed when the air temperature is between 30°F and 95°F. This test shall only be performed for the First Article test and for the first three production lots. If the requirement for penetration has been successfully met for the First Article and three (3) consecutive production lots this test may be discontinued.

3.10 Temperature stability. The action time, pressure and velocity of sample cartridges conditioned and fired at the temperature extremes specified below shall be in accordance with 3.10.1, 3.10.2, 3.10.3, and 3.10.4.

a. Conditioned at 125° ± 2°F for not less than one hour and fired at that temperature.

b. Conditioned at -65° ± 2°F for not less than one hour and fired at that temperature.

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3.10.1 Velocity. The average velocity shall not decrease by more than 250 fps from the average velocity of the sample cartridges conditioned at 70° ± 2°F. Any increase in velocity is acceptable.

3.10.2 Chamber pressure. The average chamber pressure shall not vary from the average chamber pressure of the sample test cartridges conditioned at 70° ± 2°F by more than 7000 psi. The average chamber pressures of the sample cartridges of the same lot conditioned at 125° ± 2°F shall not exceed 60,000 psi. Any decrease in chamber pressure is acceptable.

3.10.3 Port pressure. The average port pressure shall not vary by more than 2,000 psi from the average port pressure of the sample cartridges of the same lot conditioned at 70° ± 2°F, but not to be less than 12,000 psi.

3.10.4 Action time. The mean action time for these cartridges shall be as stated in 3.15.

3.11 Accuracy. Both average vertical standard deviation and the average horizontal standard deviation shall be no greater than 6.8 inches at 600 yards, or alternatively, no greater than 1.8 inches at 200 yards using an indoor range.

3.12 Function and casualty. The cartridges shall function without casualty at ambient temperature and under the temperature conditions specified below in the M249 machine gun and M16A2, AR70, L85A1, FNC, CETME L5.56, and FAMAS F1 rifles.

a. Conditioned at 125° ± 2°F for not less than one hour and fired at that temperature.

b. Conditioned at -65° ± 2°F for not less than one hour and fired at that temperature.

3.13 Fouling. The fouling accumulated in the M16A2 and M249 weapons during the firing of the sample cartridges shall not cause failure of either weapon to function.

3.14 Bullet integrity. The bullet of the cartridge shall not burst either in its passage through the barrel or in flight; neither shall the jacket of the bullet nor any part thereof strip from the other bullet components when the cartridge is fired.

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3.15 Actien time. The mean action time plus five standard deviations shall not exceed 3 milliseconds. Action time is defined as the sum of the primer ignition time, propellant burning time, and the time taken by the bullet to reach the gas port.

3.16 Barrel erosion. The average life per weapon barrel of three (3) barrels shall be not less than 10,000 rounds. The barrel life shall be considered as having ended when the average velocity of an individual burst in the test drops 200 ft/sec or more with respect to the average velocity of the initial burst of the test or when the bullets, from twenty percent or more of the cartridges show keyholing; whichever comes first. (Keyholing is defined as yaw exceeding 15° at a range of one thousand (1000) inches). The test shall be performed on the first article sample only.

3.17 First article test. When specified in the contract or purchase order (see 6.2), a sample shall be subjected to first article inspection in accordance with the technical provisions herein (see 4.4).

3.18 Workmanship. The requirements for workmanship shall be as specified on applicable drawings; referenced specifications and in accordance with the following:

a. Metal defects. The cartridge shall be free of metal defects which include, but are not limited to: folds, wrinkles, scratches, scaly metal, dents, perforations, and other discontinuities.

b. Foreign matter. The cartridge shall be free of corrosion, stains, discolorations, dirt, and smears of lacquer.

c. Cleaning. Cleaning methods used shall not be injurious to any part, nor shall the parts be contaminated by any cleaning agent.

d. Contamination of explosive components. Extreme care shall be exercised to avoid contamination of primers and propellant by oil, grease, or other foreign matter.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the

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Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 General provisions. Unless otherwise specified herein, the provisions of MIL-A-48078 apply and form a part of this specification. Reference shall be made to MIL-STD-109 to define quality assurance terms used herein.

4.2 Inspection equipment. Shall comply with MIL-A-48078 (Inspection equipment) and MIL-A-2550 (Test and measuring equipment).

4.3 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.4)

b. Quality conformance inspection (see 4.5)

4.4 First article inspection.

4.4.1 Submission. The contractor shall submit a first article sample as designated by the Contracting Officer for evaluation in accordance with provisions of 4.4.2. The first article sample shall consist of the assemblies, components and test specimens listed below in the quantities indicated.

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PART DESCRIPTION	DRAWING	QUANTITY
Cartridge, 5.56mm, Ball M855	9342868	45,000
Bullet, Ball, 5.56mm	9342869	25
or Bullet, Ball, 5.56mm (Alernative)	9392531	25
Slug	9349656	25
Jacket	9349657	25
Jacket, Pointed	9349678	25
or Jacket, Pointed (Alternative)	9392530	25

4.4.2 Inspections to be performed. As determined by the Government, the first article assemblies, components and test specimens may be subjected to any or all of the examinations and tests specified in this detail specification (see Table I) and be inspected for compliance with any or all requirements of the applicable drawings.

4.4.3 Rejection. If any assembly, component or test specimen fails to comply with any of the applicable requirements, the first article sample shall be rejected. The Government reserves the right to terminate inspection upon any failure of an assembly, component or test specimen to comply with any of the requirements.

TABLE I. First article inspection.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
	Jacket, Pointed	1 OF 4	9349678/9392530
			NEXT HIGHER ASSEMBLY
			9342869/9392531

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Diameter	25 0-1	3.2	Standard Measurement Test Equipment (SMTE)
	Base thickness	25 0-1	3.2	SMTE
	Base thickness variation	25 0-1	3.2	SMTE
	Wall thickness at chamfer	25 0-1	3.2	SMTE
	Improper weight	25 0-1	3.2	Balance
	Evidence of poor workmanship	25 0-1	3.18	Visual

NOTES:

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TABLE I. First article inspection.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE		SHEET 2 OF 4	DRAWING NUMBER
	Slug			9349656
				NEXT HIGHER ASSEMBLY
				9342869
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Improper weight	25 0-1	3.2	Balance
	Evidence of poor workmanship	25 0-1	3.18	Visual

NOTES:

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TABLE I. First article inspection.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
	Bullet, Ball, 5.56mm/Bullet, Ball, 5.56mm (Alternative)	3 OF 4	9342869/9392531
			NEXT HIGHER ASSEMBLY: 9342868

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Diameter of bourrelet	25 0-1	3.2	SMTE
	Concentricity of boat-tail to bourrelet diameter	25 0-1	3.2	SMTE
	Length of boat-tail	25 0-1	3.2	SMTE
	Angle of boat-tail	25 0-1	3.2	SMTE
	Length of bullet	25 0-1	3.2	SMTE
	Distance from bullet tip to cannelure	25 0-1	3.2	SMTE
	Concentricity of bullet tip to bourrelet diameter	25 0-1	3.2	SMTE
	Diameter of knurl	25 0-1	3.2	SMTE
	Ogive radius	25 0-1	3.2	SMTE
	Bullet tip, width	25 0-1	3.2	SMTE
	Improper weight	25 0-1	3.2	Balance
	Improper contact of slug to surface "x"	25 0-1	3.2	Visual
	Damaged cannelure	25 0-1	3.2	Visual
	Lead above bullet base	25 0-1	3.2	Visual
	Evidence of poor workmanship	25 0-1	3.18	Visual

NOTES:

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TABLE I. First article inspection.

CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
CLASSIFICATION	Cartridge, 5.56mm, Ball, M855	4 OF 4	9342868
			NEXT HIGHER ASSEMBLY

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA		REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
	Examination of Defects				
	Critical	45,000	0-1	3.1	4.5.6
	Major	172	0-1	3.1	4.5.6
	Minor	57	0-1	3.1	4.5.6
	Tests				
	Bullet extraction 1/	75	2-3	3.3	4.6
	Waterproofness	50	3-10	3.5	4.6
		150	9-10		
	Residual stress 1/	150	1-2	3.4	4.6
	Hardness (head)	10	0-1	3.1	4.6
	Hardness (side wall)	10	0-2	3.1	4.6
		30	1-2		
	BALLISTIC TESTS - 4.5.7			3.6 to 3.15	4.6
	Barrel erosion	30,000		3.16	4.6

NOTES:
1/ No retest permitted during First Article Test.

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4.5 Quality conformance inspection.

4.5.1 Lot formation. Lot formation shall comply with MIL-A-48078.

4.5.2 Lot submission. The product shall be submitted in accordance with MIL-A-48078.

4.5.3 Component parts. Unless otherwise specified, component lots shall be homogeneous and of a size convenient to the contractor and inspected, tested and accepted by the contractor. The cartridge lot shall not contain:

a. Cartridge cases from more than one manufacturer or process.

b. Primers from more than one lot interfix number from one manufacturer.

c. Bullets from more than one manufacturer.

d. Bullets from more than one process.

e. Propellant from more than two lots.

f. Propellant from more than one manufacturer.

4.5.4 Lot identification. Each lot of ammunition shall be identified as to type, caliber and model, and shall incorporate a lot number in accordance with MIL-STD-1168.

4.5.5 Inspections to be performed. Inspection shall be as specified in 4.5.6 (Examination and tests) and the Quality Conformance Testing Table.

4.5.6 Examinations and tests.

a. Classification of characteristics. Quality conformance examinations and tests are specified in the following Classification of Characteristics paragraphs. The contractor's quality program or detailed inspection system shall provide assurance of compliance of all characteristics with the applicable drawing and specification requirements utilizing as a minimum the conformance criteria specified. When cited herein, attributes sampling inspection shall be conducted in accordance with Table II using the inspection levels stated in the Classification of Characteristics paragraphs. Examination shall be visual or by means of a Government approved automated inspection system such as optical, mechanical or electrical. All non-conforming cartridges shall be rejected. If a visual critical defect is found in a sample either just prior to a firing test or after a firing test (and the defect is not due to the firing), the lot shall be rejected.

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TABLE II. Attributes sampling inspection

Lot Size	Inspection Levels I	II
91 to 150	50	12
151 to 280	50	19
281 to 500	50	21
501 to 1200	75	27
1201 to 3200	116	35
3201 to 10000	116	38
10001 to 35000	135	46
35001 to 150000	170	56
150000 to 500000	200	64
500001 and over	244	64

Numbers under inspection levels indicate sample size. Accept on zero and reject on one or more for all inspection levels.

b. Alternative quality conformance provisions. Unless otherwise specified herein or provided for in the contract, alternative quality conformance procedures, methods or equipment, such as statistical process control, tool control, variables sampling or other types of sampling plans, etc., may be used by the contractor when they provide, as a minimum, the level of quality assurance required by the provisions herein. Prior to applying such alternative procedures, methods or equipment, the contractor shall describe them in a written proposal submitted to the Government for evaluation (see 6.9). When required, the contractor shall demonstrate that the effectiveness of each proposed alternative is equal to or better than the specified quality conformance provision(s) herein. In case of dispute as to whether the contractor's proposed alternative(s) provides equivalent assurance, the provisions of this specification shall apply. All approved alternative provisions shall be specifically incorporated into the contractor's quality program or inspection system, as applicable.

QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET 1 OF 3	DRAWING NUMBER
4.5.6.1	Cartridge, 5.56mm, Ball: M855 (Inspection)		9342868
			NEXT HIGHER ASSEMBLY: Not applicable

CLASSIFICATION	EXAMINATION OR TEST 3/	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
CRITICAL:				
1.	Perforated Case (7)	100%	3.1	Gage
2.	Case split in K, L or M location (6)	100%	3.1	Gage
3.	Weight min 1/	100%	3.1	See note 2/
SPECIAL:				
a.	Primer missing (32)	100%	3.1	Visual
b.	Primer cocked (33)	100%	3.1	Visual
c.	Primer inverted (34)	100%	3.1	Visual
MAJOR:				
101.	Total Length	Level I	3.1	Gage
102.	Case split in I, S, or J location	Level I	3.1	Visual
103.	Corrosion or stain with etching (2)	Level I	3.1	Visual
104.	Chamfer missing on head (rim) (13)	Level I	3.1	Visual

NOTES: 1/ Each lightweight cartridge shall be disassembled and the propellant weighed. Any cartridge containing less than 13 grains of propellant shall be classed as a critical defect. Any cartridge containing 13 grains or more of propellant shall be classed a major defect. 2/ One hundred percent examination for weight may be either by weighing or by measuring for propellant fill; method used must be capable of detecting a cartridge containing less than 13 grains of propellant. 3/ Refer to MIL-STD-636 (NATO Caliber 7.62mm Section) for visual defect standards for defects 1 through 38. Inspection for visual defects may be performed employing an automated inspection system that has been approved by the Government.

AMSMC Form 1570a, 1 Jul 89

Replaces AMSMC Form 1570a, 1 Apr 85, which may not be used.

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CLASSIFICATION OF CHARACTERISTICS

PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
4.5.6.1	Cartridge, 5.56mm, Ball: M855 (Inspection)	2 OF 3	9342868
			NEXT HIGHER ASSEMBLY: Not applicable

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
105.	Case mouth not crimped in cannelure (11)	Level I	3.1	Visual
106.	No evidence of mouth anneal (21)	Level I	3.1	Visual
107.	Draw scratch (8)	Level I	3.1	Visual
108.	Split bullet jacket (24)	Level I	3.1	Visual
109.	Loose bullet (25)	Level I	3.1	Visual
110.	Loose primer (35)	Level I	3.1	Visual
111.	Scaly metal (12)	Level I	3.1	Visual
112.	Profile and alignment	Level I	3.1	Gage
113.	Diameter head	Level I	3.1	Gage
114.	Thickness of head	Level I	3.1	Gage
115.	Length to shoulder datum diameter	Level I	3.1	Gage
116.	Depth of primer	Level I	3.1	Gage
117.	Diameter of extractor groove, max	Level I	3.1	Gage
118.	NATO mark missing or illegible	Level I	3.1	Visual
119.	Dent (5)	Level I	3.1	Visual

NOTES:
Refer to MIL-STD-636 (NATO) Caliber 7.62mm Section) for visual defect standards for defects 1 through 38. Inspection for visual defects may be performed employing an automated inspection system that has been approved by the Government.

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QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF CHARACTERISTICS

MIL-C-63989C(AR)

PARAGRAPH	TITLE		SHEET 3 OF 3	DRAWING NUMBER
4.5.6.1	Cartridge, 5.56mm, Ball: M855 (Inspection)			9342868
				NEXT HIGHER ASSEMBLY: Not applicable
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
MINOR:				
201.	Discolored, dirty, oily, or smeared (1)	Level II	3.1	Visual
202.	Case dented (5)	Level II	3.1	Visual
203.	Scaly metal on case (12)	Level II	3.1	Visual
204.	Fold, wrinkle, buckle or bulge in case (14, 15, 16, 17)	Level II	3.1	Visual
205.	Head stamp missing or illegible (18)	Level II	3.1	Visual
206.	Defective head (19)	Level II	3.1	Visual
207.	Defective mouth (20)	Level II	3.1	Visual
208.	Bullet dented (22)	Level II	3.1	Visual
209.	Bullet scratched (23)	Level II	3.1	Visual
210.	Scaly metal on bullet (27)	Level II	3.1	Visual
211.	Upset (crooked) point (28)	Level II	3.1	Visual
212.	Blunt point (30)	Level II	3.1	Visual
213.	Defective cannelure (31)	Level II	3.1	Visual
214.	Nicked or dented primer (36)	Level II	3.1	Visual
215.	No waterproofing material (primer pocket joint) (37)	Level II	3.1	Visual
216.	Defective crimp (38)	Level II	3.1	Visual
217.	Scratch (case) (9)	Level II	3.1	Visual
218.	Missing or improper color of bullet tip	Level II	3.1	Visual
219.	Extractor groove diameter undersized	Level II	3.1	Gage

NOTES: Refer to MIL-STD-636 (NATO Caliber 7.62mm Section) for visual defect standards for defects 1 through 38. Inspection for visual defects may be performed employing an automated inspection system that has been approved by the Government.

AMSMC Form 1570b-E, 1 Jul 89 Replaces AMSMC Form 1570, 1 Feb 85, which may not be used.

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QUALITY CONFORMANCE INSPECTION

CLASSIFICATION OF CHARACTERISTICS

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PARAGRAPH	TITLE	SHEET	DRAWING NUMBER
4.5.6.2	Cartridge, 5.56mm, Ball: M855 (Testing)	1 OF 1	9342868
			NEXT HIGHER ASSEMBLY

CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD REFERENCE
CRITICAL	None defined.			
MAJOR:				
101.	Bullet extraction	25 0-3 75 2-3	3.3	4.6
102.	Waterproofness	50 3-10 150 9-10	3.5	4.6
103.	Residual stress	50 0-2 150 1-2	3.4	4.6
104.	Hardness (head)	10 0-1	3.1	4.6
105.	Hardness (sidewall)	10 0-2 30 1-2	3.1	4.6
106.	BALLISTIC TESTS (see 4.5.7)			
MINOR	None defined.			

NOTES:

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4.5.7 Ballistic testing. The ballistic tests are specified in Table III. Firing defects are specified in Table IV. Tests shall be conducted as specified in 4.6.

4.5.7.1 Ballistic test samples. The quantities for the various ballistic tests are as specified in Table III. Only cartridges that have been previously submitted to and passed the requirements of the critical inspections specified in para 4.5.6.1 shall be used for the ballistic tests. To assure a random sample for each test the sample cartridges from the lot shall be combined and intermixed prior to being divided into samples for the various test.

TABLE III
Ballistic Test Samples
Temperatures (°F)

Test	Ambient	70° ± 2°	-65° ± 5°	+125° ± 2°	Requirement Para
Action Time 1/		20	20	20	3.15 & 3.10
Velocity 1/		20	20	20	3.6 & 3.10
Chamber press 1/		20	20	20	3.7 & 3.10
Port press 1/		20	20	20	3.8 & 3.10
Function and Casualty					
M249 2/	400		200	200	3.12
M16A2 2/	400		200	200	3.12
AR70 3/	100		100	100	3.12
L85A1 3/	100		100	100	3.12
FNC 3/	100		100	100	3.12
FAMAS F1 3/	100		100	100	3.12
CETME L5.56	100		100	100	3.12
Accuracy at 200 yards or 600 yards 4/	90				3.11
Fouling 5/	800		400	400	3.13
Penetration 6/	50				3.9
Bullet integrity 7/	200				3.14

1/ Failure of the cartridges in any sample to comply with the applicable requirements shall be cause for rejection of the lot subject to testing of a second sample consisting of double the quantity of cartridges used in the first test for the temperature or temperatures at which the failure occurred. The lot shall be rejected if the cartridges in the second sample fail to comply with the applicable requirements. Action time, chamber pressure and port pressure tests shall be conducted simultaneously with velocity.

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2/ The acceptance and retest numbers of Table IV shall be applied to the M249 results (all temperatures combined) and the M16A2 results (all temperatures combined) individually. All Function and Casualty defects observed in other ballistic tests shall be included in both the M249 and M16A2 defect counts in the evaluation. When either weapon test is failed and a retest is permitted by Table IV, both weapon tests shall be repeated with sample sizes doubled. The cumulative (1st and 2nd test combined) defect count shall be evaluated against the cumulative acceptance criteria of Table IV for both the M249 and M16A2 individually.

3/ If any defect listed in Table IV occurs, additional rounds shall be fired in that weapon type until the ballistic sample sizes equal those shown for M16A2 Function and Casualty. The acceptance and retest numbers of Table IV shall then be applied to the results (all temperatures combined). If the test is failed, and a retest permitted by Table IV, that weapon test shall be repeated with double the sample size shown for M16A2 Function and Casualty. The cumulative defect count (1st and 2nd test combined) shall be evaluated against the cumulative acceptance criteria of Table IV.

4/ Three 30-round targets shall be fired. A retest is permitted whereby the results of the first test are excluded and six 30-round targets are fired, averaged and checked for compliance with the requirements. The retest shall be fired at 600 yards. Only one target miss is permitted out of all "Valid Targets" as defined in SCATP-5.56mm (Heavy Bullet).

5/ The sample for this test shall be the sample specified for the Function and Casualty test for each respective weapon, i.e., 800 rounds for the M249 and 800 rounds for the M16A2.

6/ Accept/reject, retest criteria for this test is 50-2-5/100-4-5.

7/ The two hundred round sample shall be composed of the following:

a. One hundred rounds from the M249 Function and Casualty test.

b. Sixty rounds from the M16A2 Function and Casualty test: 3-round burst mode.

c. Forty rounds from the M16A2 Function and Casualty test: Single shot mode.

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Failure of four or more bullets (from the total sample) to comply with the applicable requirements shall be cause for rejection of the lot. If more than one but less than four bullets fail in the first test, a second sample of 200 cartridges shall be tested in different M249 and M16A2 weapons than were used in the first test. The lot shall be rejected if in the combined first and second sample, four or more bullets fail to comply with the applicable requirements.

4.5.7.2 Function and casualty defects in ballistic test. For any ballistic test except function and casualty, where the occurrence of a firing defect prevents the obtaining of a valid result for the characteristic being tested the following shall apply.

a. The defect shall be recorded under the appropriate function and casualty defect category and included in the defect count for determining acceptance or rejection in accordance with Table IV.

b. The particular test for which the round was fired shall not be penalized.

c. A replacement round shall be fired to obtain the data for the characteristic being tested.

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TABLE IV

Function and casualty defect classification and accept/reject criteria

DEFECT	FIRST SAMPLE ACCEPT	FIRST SAMPLE REJECT	CUMULATIVE ACCEPTANCE NO.
1. Misfire 1/			
a. No vent hole, or obstruction in vent area 2/	0	1	-
b. Other	1	3	2
2. Bullet remaining in bore 2/	0	1	-
3. Primer leaks:			
a. Perforation in firing pin indent in primer cup			
(1) M249 Machine gun	0	See 3/	1
(2) M16A2 Rifle	0	See 3/	1
b. Escape of gas through primer cup (excluding 3 a. above)	1	3	2
c. Escape of gas around primer cup			
(1) 50% or more than 50% of periphery	3	7	9
(2) Less than 50% of periphery	5	9	13
d. Blown primer - Primer separates from casehead and primer pocket is grossly distorted. 2/	0	1	-
e. Dropped primer - Primer falls out of pocket upon retraction of bolt	0	2	1
f. Loose primer - Primer remains in pocket but is physically loose	0	2	2
4. Case casualties			
a. Longitudinal split 4/			
(1) Neck and shoulder (I or S)	5	9	13
(2) Body (J)	3	7	9
(3) Body (K)	0	2	1
(4) To head (L)	0	2	1
(5) Through head (M)	0	2	1

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	FIRST SAMPLE ACCEPT/REJECT		CUMULATIVE ACCEPTANCE NO.
b. Circumferential rupture 4/			
(1) Partial, shoulder or body (J and S)	1	3	2
(2) Partial, body (K)/2	0	1	-
(3) Partial head (L) 2/	0	1	-
(4) Complete 2/	0	1	-
5. Failure to extract	0	2	1
6. Weapon stoppage 5/	0	2	1

1/ Each cartridge that misfires shall be disassembled and examined for presence of vent hole in primer pocket, or any obstruction in the vent hole area of the primer pocket that can be assignable as the cause for misfire. If the vent hole is missing or obstructed, the lot shall be rejected with no second sample permitted.

2/ No second sample permitted. Lot shall be rejected.

3/ If one or more defects are found in the first sample, a second sample shall be fired in both weapons. The second sample shall consist of double the quantity of cartridges specified under function and casualty of Table III for each weapon. Prior to the testing of the second sample, the firing pin of the specific weapon(s) in which the defect originally occurred shall be replaced with a new firing pin. If an additional primer perforation is found in the second sample, the lot shall be rejected.

4/ For location of defects indicated by letters in parentheses, see Drawing C7643674.

5/ All stoppages attributable to the ammunition, with the exception of misfire, complete rupture or failure to extract, observed in all tests shall be included.

4.5.8 Packaging, packing and marking inspection. During or immediately prior to the packaging operation, 100% examination of the cartridges shall be performed to ascertain that the lot does not contain a blank cartridge or a cartridge with the bullet missing. Examination shall be visual or by means of a Government-approved inspection system. All non-conforming cartridges shall be removed from the lot. A sample of 244 shall be selected from each lot and examined for the presence of a high pressure test, dummy or blank cartridge, or a cartridge with the bullet missing. If a high pressure test, dummy or blank cartridge, or a cartridge with the bullet missing is found, the lot shall be rejected. Any occurrence of a high pressure test, dummy or blank cartridge, or

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a cartridge with the bullet missing after this inspection shall cause the lot to be rejected. Inspection for packaging, packing and marking shall be in accordance with MIL-STD-644 as applicable to the drawing.

4.5.9 Inspection equipment. The inspection equipment required to perform the inspections specified herein is identified in the "Inspection Method Reference" column of the Classification of Characteristics listings starting with 4.4.2.1. Contractor inspection equipment designs shall be submitted for Government approval as specified in the contract. Designs which provide variable measurements instead of attributes data are preferred in order to facilitate the use of statistical process control. See MIL-A-48078 and 6.3 herein.

4.6 Methods of inspection.

The following tests shall be conducted in accordance with the test procedure document; SCATP-5.56mm (Heavy Bullet):

Barrel erosion
Bullet extraction
Waterproof
Residual Stress
EPVAT
Chamber pressure
Port pressure
Velocity
Action time
Temperature stability
Function and casualty
Fouling
Bullet integrity
Accuracy
Penetration

4.6.1 Hardness testing. The bullets shall be extracted, the propellant removed and the primers extracted. Each cartridge case of the sample shall be prepared and placed on the appropriate test fixture for testing in accordance with ASTM Method E92.

4.6.1.1 Case sidewall. The average of the hardness values of the sample cases for each prescribed point along the sidewall exterior surface shall be computed and recorded in accordance with the drawing requirements.

4.6.1.2 Case head. The individual hardness value for each prescribed point on the head section of each sample case shall be recorded. Any value failing to meet the drawing requirement at prescribed point(s) shall be cause for measurement of hardness at the corresponding point(s) on the opposite side of the primer pocket of the same head section from which the initial value was

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obtained. The higher of the two measurements shall be recorded as the value of record for determination of conformance to drawing requirements.

5. PACKAGING

5.1 Packing - Level A. (Worldwide shipment) - The cartridges shall be packed in accordance with Drawing 12551963 or 12590217.

5.2 Marking and labeling. Packing boxes shall be marked and labeled in accordance with the applicable drawing cited in 5.1.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory).

6.1 Intended use. The components covered by this specification are intended for use in the Cartridge, 5.56mm, Ball, M855.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of this specification.

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1).

c. Requirements for submission of first article sample.

d. Type and level of packing (see 5.1).

e. Provision for submission of Inspection Equipment Designs.

f. Provision for submission of detailed inspection plan for the cartridge (See 6.7).

g. Provisions for submission of acceptance inspection results for each lot of ammunition presented to the Government (See 6.6).

6.3 Submission of inspection equipment designs for approval. Equipment designs shall be submitted as required to: Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: SMCAR-QAF-I, Picatinny Arsenal, N.J. 07806-5000. This address will be specified on the Contract Data Requirements Lists, DD Form 1423 in the contract.

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6.4 Hazard notice. The cartridge described herein and some of its components are flammable or explosive and consequently present hazards in manufacture, handling, storage and shipment. The contractor should recognize these hazards and take appropriate measure to prevent fire, explosion, adverse environment, rough handling, corrosive atmosphere, or electrically induced incidents. Such measures shall include the employment of an effective safety program that addresses the inherent hazards associated with the cartridge.

6.5 Drawings. Drawings listed in Section 2 of this specification under the heading US Army Armament Research, Development and Engineering Center (ARDEC) may also include drawings prepared by, and identified as Edgewood Arsenal, Frankford Arsenal, Rock Island Arsenal, Picatinny Arsenal, or US Army Armament Research and Development Center (ARDC) drawings. Technical data originally prepared by these activities are now under the cognizance of ARDEC.

6.6 Submission of test data. In addition to the normal distribution of records, when the cartridge is procured by the U.S. Army, one (1) copy of all ballistic data and the ammunition data card for each lot should be forwarded to: Commander, ARDEC, ATTN: SMCAR-QAF-S, Picatinny Arsenal, NJ 07806-5000.

6.7 Submission of detailed inspection plan for review. The detailed inspection plan for the cartridge should be submitted to the responsible U.S. Government quality assurance element.

6.8 Subject term (key word) listing.

Ammunition
Bullet
Small Arms
Testing

6.9 Submission of alternative quality conformance provisions. Unless otherwise specified in the contract, proposed alternative quality conformance provisions will be submitted by the contractor for evaluation by the technical activity responsible for the preparation of this specification.

6.10 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
Army-AR

Preparing activity:
Army-AR

(Project 1305-AE80)

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-C-63989C (AR)	940215

3. DOCUMENT TITLE: CARTRIDGE, 5.56MM BALL, M855

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets if needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (Include Area Code)	
U.S ARMY ARDEC STANDARDIZATION OFFICE	(1) Commercial 201-724-6675	(2) AUTOVON DSN-880-6675
c. ADDRESS (Include Zip Code) ATTN: SMCAR-BAC-S PICATINNY ARSENAL, NJ 07806-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	